

# *Single particles simulations*

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# *Off-topic*

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John Haggerty asked me to put together some example codes, how to analyze a DST output. This intended for those who are new to sPHENIX..

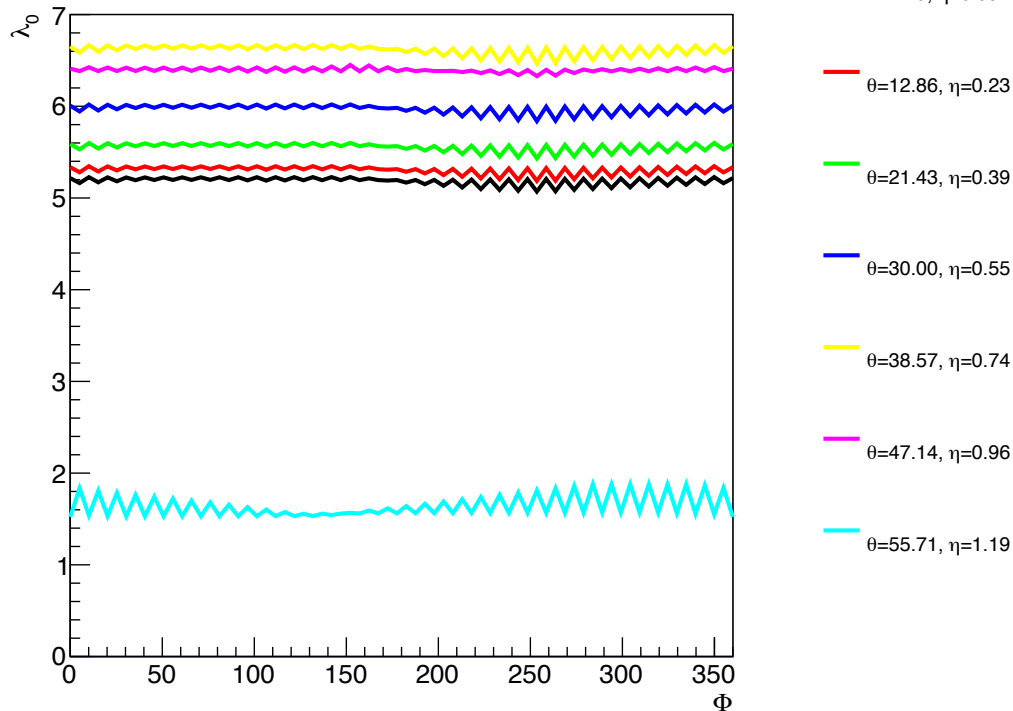
<https://github.com/sPHENIX-Collaboration/analysis/tree/master/Ana>

It creates ntuples and histograms.

```
PHAna *ana = new PHAna();  
ana->set_flag( PHAna::TRUTH, true); //Outputs truth particle ntuple  
ana->set_flag( PHAna::HIST, true); //Fills some histograms like zvertex  
ana->set_flag( PHAna::SF, true); //Fills the sampling factor ntuple  
//ana->set_flag( PHAna::ALL, true);  
se->registerSubsystem( ana );
```

# Geant4 material scan

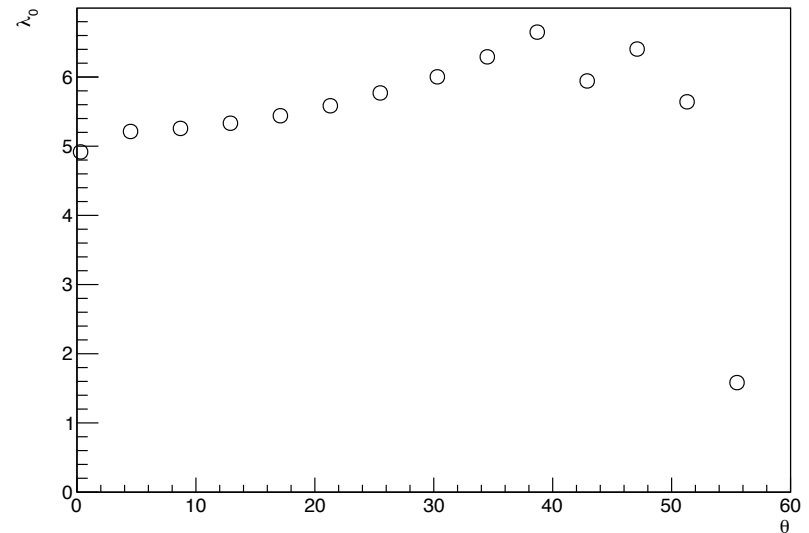
Only inner and outer HCAL.



Did we understand the spikes yes? Spikes gets bigger when EMCAL is there.

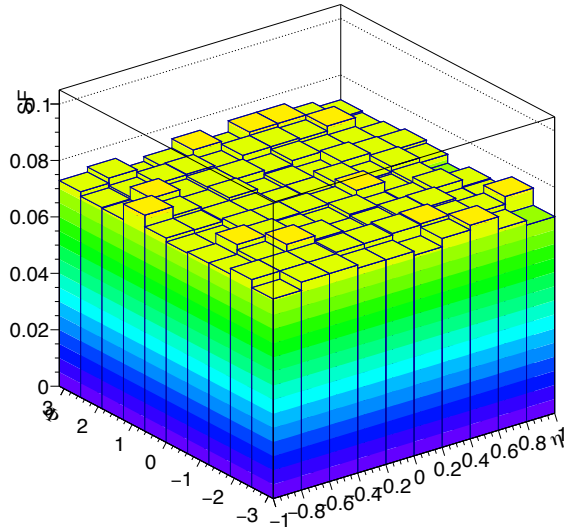
I scanned sPHENIX setup with Geant4 “matscan” in a wide theta and phi range.

Theta=0 corresponds to eta=0.

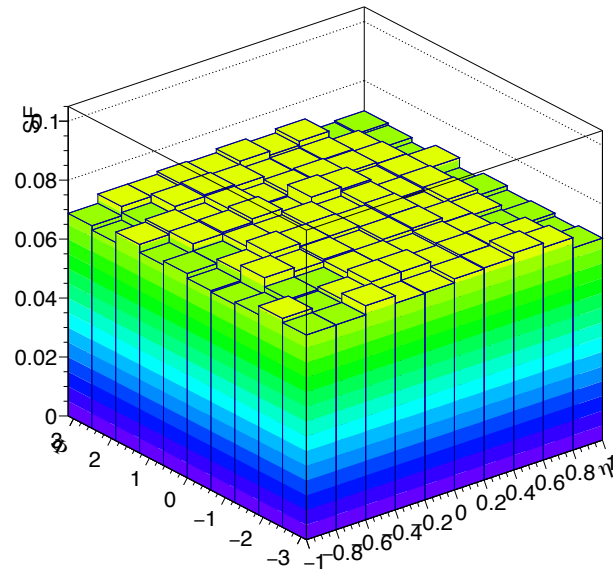


# *Hcalin Sampling factors*

Muon sampling factors

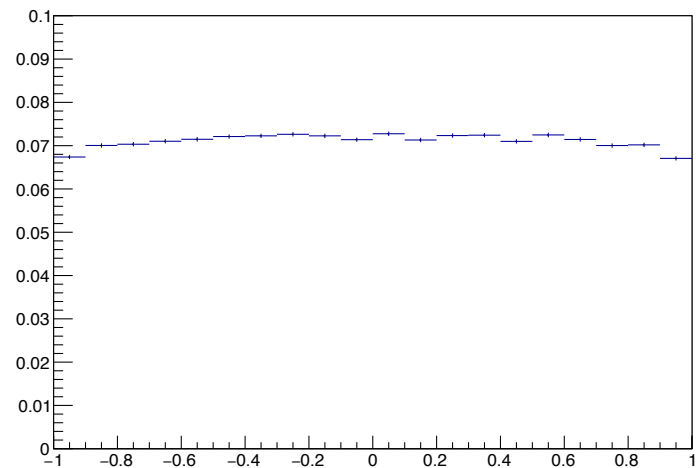


Pion sampling factors



No dependence on eta or phi.

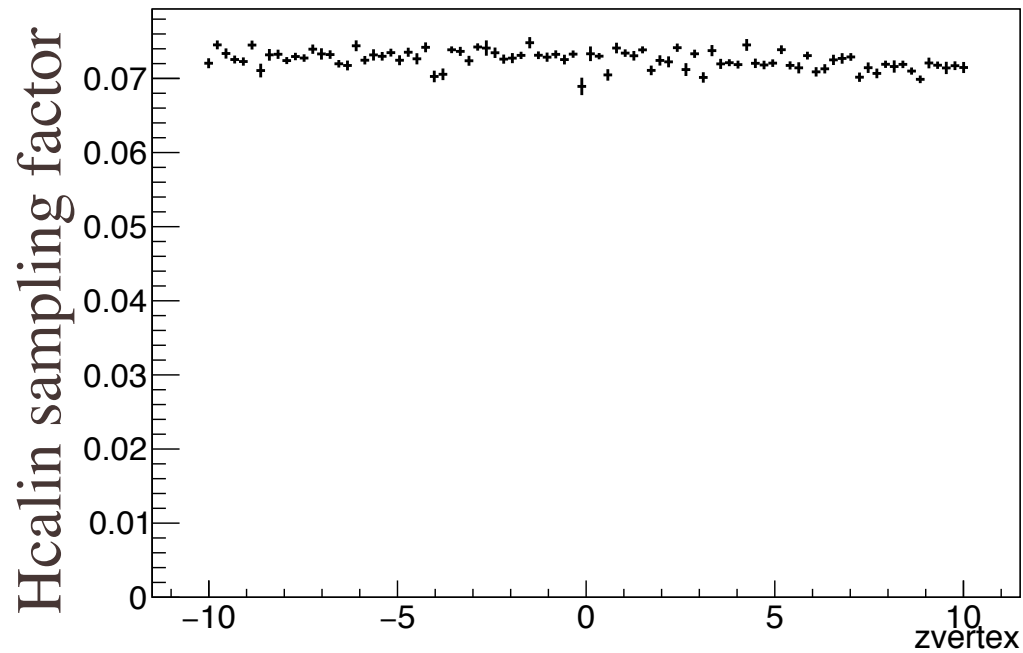
A 20% change in the interaction length corresponds to very little change in sampling factors. Is this expected?



Eta

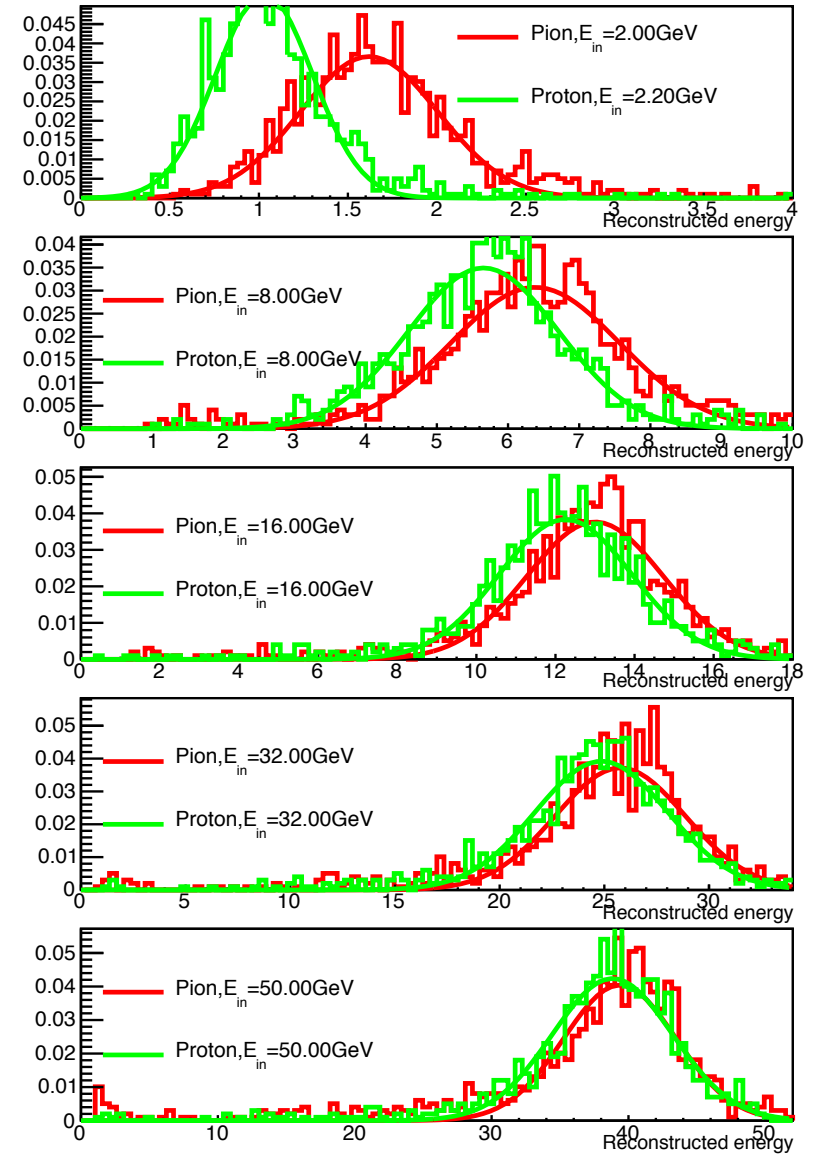
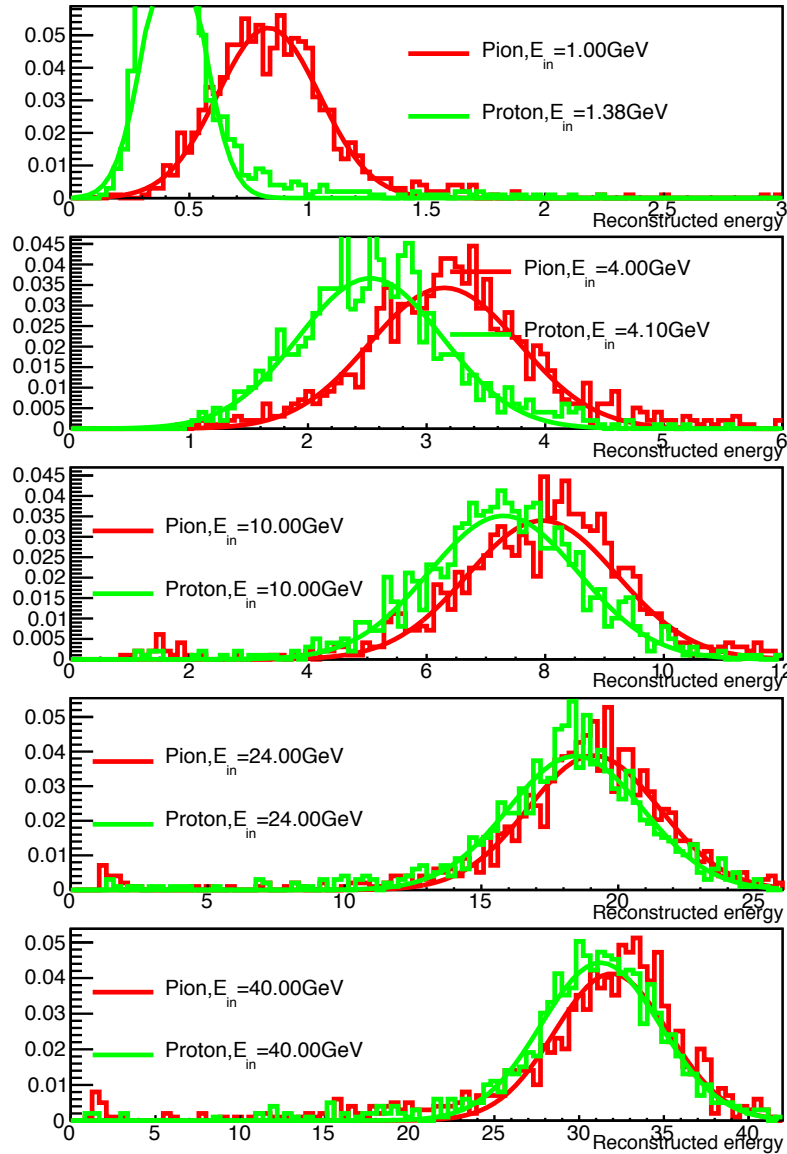
# *Zvertex dependence*

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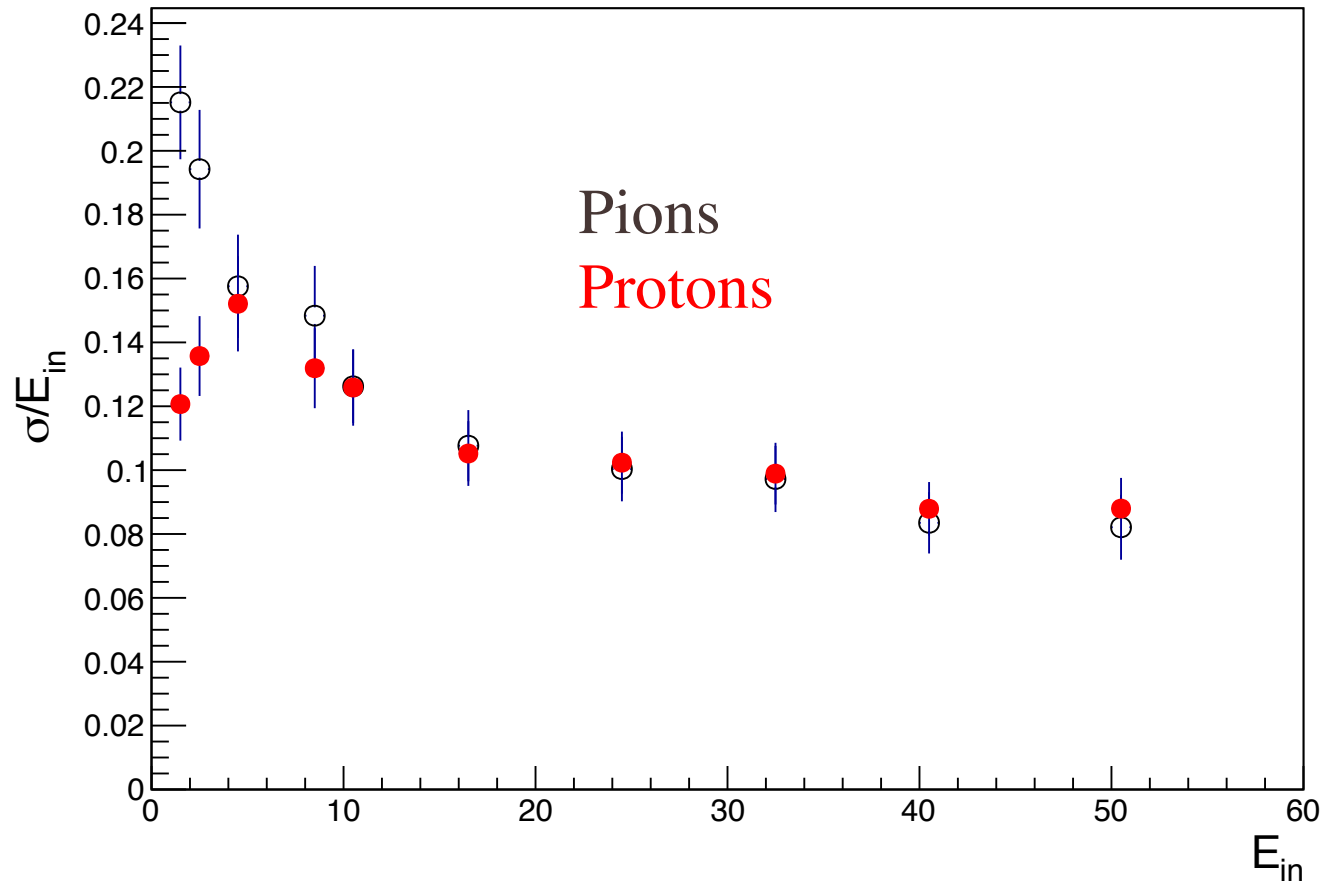


No vertex dependence either.

# Energy reconstruction

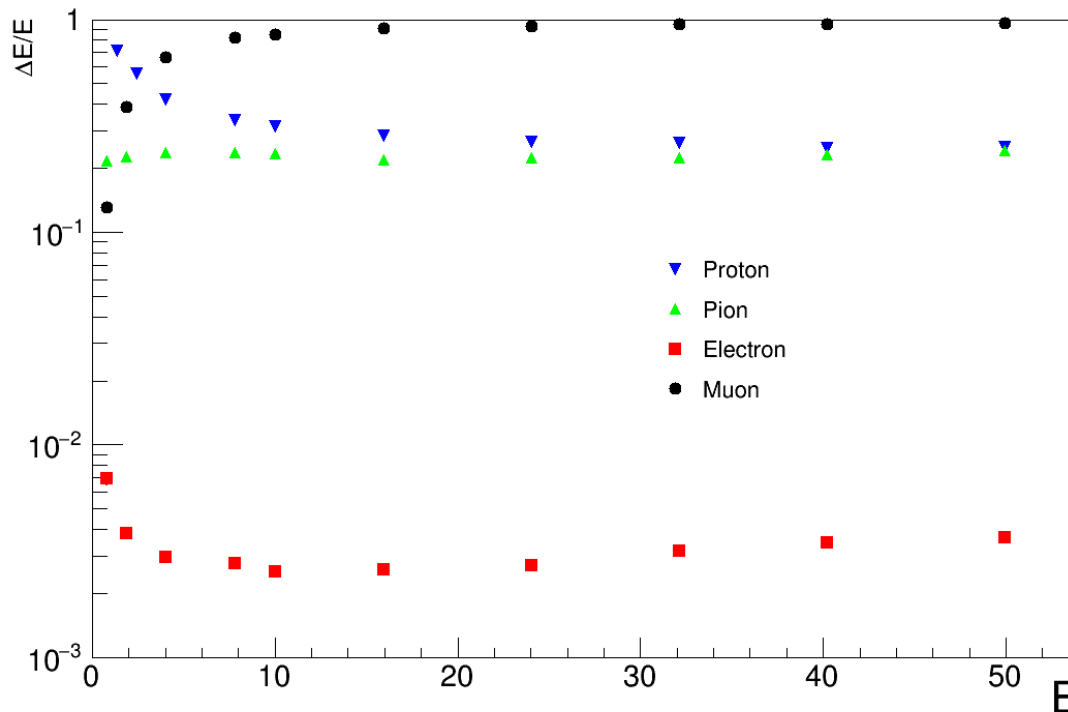


# Resolution



Not accounted for the missing energies. The simulation includes all EMCal, inner and outer Hcal.

# Missing Energies



Missing energy corresponds to energy not accounted in EMCal or Hcal.  
As expected, most of the muon energies are lost. Pions and protons deviate in the lower energy region.

Should we use generic scale to correct for the missing energies?



# *Summary*

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- ❖ 20% change in the interaction length corresponds to small change in sampling factors.
- ❖ Need to account for the missing energies.